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Military Interoperable Digital Hospital Testbed (MIDHT)

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CONTRACTING ORGANIZATION:

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Johnstown, PA 15905-4398

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14. ABSTRACT

The MIDHT project continues to research health information technologies (HIT) and develop health information exchange (HIE) capabilities within the Conemaugh Health System. Core technologies under evaluation include electronic health records (EHR), Picture Archive and Communications System (PACS) and personal health records (PHR). In addition, the project's operational test HIE between DoD and Conemaugh has been aligned with the Nationwide Health Information Network (NHIN). Subcontractor Northrop Grumman provided valuable technical and documentation assistance to the White House mandated Virtual Lifetime Electronic Record (VLER) 1a project in San Diego, CA. All source/binary code and technical documentation has been provided to the government. Research activities are in progress and will continue to the end of the period of performance.

15. SUBJECT TERMS
Virtual Lifetime Electronic Record
Picture Archive and Communications System
Nationwide Health Information Network
Personal Health Records

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Introduction

The Military Interoperable Digital Hospital Testbed (MIDHT) is a five-year program of research to develop a real-world testbed environment in Southwestern PA (SW PA). The purpose of MIDHT is to research and evaluate Health Information Exchange (HIE) and health information technology (HIT) and services (HITS) that make health information readily available to consumers and providers, which will allow for the secure transfer of information between the Military Health System (MHS) and private sector rural providers. MIDHT will also define requirements and solutions to optimize healthcare resources for rural communities and identify lessons learned and best practices that benefit both the global MHS environment and stakeholders in SW PA. The Department of Defense (DoD) and Conemaugh Health System (CHS) have common requirements for HIE, connecting disparate systems and providers and enabling secure provider-provider and provider-consumer e-communications. Minimal evidence is available on what business, clinical and technical solutions can be used to overcome the lack of specialists, infrastructure and geographical barriers associated with the delivery of care in rural communities.

Arm 1: Longitudinal Study for Use of Interoperable Accessible Health Information Exchange Services and Technologies in Rural Communities

This arm focuses on ways a rural environment can capitalize on the use of health information network (HIN) services and technologies to promote interoperability between disparate entities to improve patient care, safety and quality. MIDHT will investigate attitudes, usability, and effectiveness of HIN services by rural providers, including the effect of the use of HIT/HIE tools by provider groups, TRICARE providers and three CHS facilities on their business practices and process flows. Research initiatives will focus on the impact of an electronic health record implementation using instruments utilized in year 1. Additionally, research initiatives will evaluate the ability to electronically access digital radiology images and how this system-wide functionality will affect the delivery of patient care within a rural health care system, to include an analysis on provider productivity, throughput, duplicative testing and continuity of care. Finally, an assessment of the volume of cases that Conemaugh physicians have with the Social Security Administration (SSA) regarding veteran/military disability claims and assess provider satisfaction with existing SSA process will be performed. Northrop Grumman (NG) IT is a key subcontractor for this effort and has been tasked with software development activities to connect the Department of Defense and Conemaugh Health System into the Nationwide Health Information Network (NHIN).

Arm 2: The Impact of Consumer Informatics in the Chronic Care Model: Metabolic Syndrome in a Rural Setting.

This arm focuses on finding innovative solutions to slow down the growing epidemic of metabolic syndrome through consumer informatics. A personal health record (Relay Health) will be offered to enrolled research patients for a six month time period. Patients will be able to create a personal health record and communicate electronically with their physician/staff. Two

Conemaugh pilot sites are participating, including Portage Health Center and CPG Berkley Hills. Changes in clinical outcome measures will be compared to a control group. In addition, PHR survey results and usage reports will be analyzed to make sound conclusions.

Body

SW PA offers an ideal testbed for evaluating the effectiveness of applying a HIN services infrastructure. The CHS is the primary source of healthcare services in Cambria and Somerset counties, which services primarily a rural population around Johnstown, PA. This system has one tertiary care facility-- Memorial Medical Center (MMC), and includes relatively small facilities for secondary care: Miners Medical Center (MiMC) to the north and Meyersdale Medical Center (MyMC) to the south, which is also a designated Critical Access Hospital. There are approximately 100 multi-specialty physicians in the Conemaugh Physician Group (CPG). Project specific sites for EHR implementation within CPG include Portage Health Center and NORCAM Community Health Center.

CHS offers a continuum of care, from highly specialized services such as a Level 1 Regional Resource Trauma Center and a Level III neonatal intensive care unit to award-winning community wellness and clinical care. CHS offers seven physician residencies and strong research affiliations with government and academic partners. CHS has 4,500 employees, more than 350 physicians (active and courtesy) and more than 600 licensed patient beds.

Rural Healthcare Landscape

- Little or no IT infrastructure in rural hospitals and physician offices
- Access to healthcare resources lacking in rural communities outside of Johnstown
- Aging population, higher risk for chronic diseases
- Physician recruitment a major challenge
- Rural providers may feel isolated
- Emergency Room visits increasing rapidly (CVMH: 70,644 – FY 2009)
- Lack of high-speed internet/technical support in rural areas
- Capital investment is limited
- Patients may travel long distances to seek care

Statement of Work

Arm 1. Longitudinal Study for the Use of Interoperable Accessible Health Information Exchange Services and Technologies in Rural Communities

Subtask 1.1 Assess changes in provider workflows and efficiency resulting from the implementation of an ambulatory electronic medical record.

Subtask 1.2 ***Enhance the service-based HIE infrastructure and services to support further exchange of digital medical imaging information in a rural setting.***

Subtask 1.3 Research and evaluate the ability to electronically exchange digital images and how this functionality will affect the delivery of patient care within a rural health care system, to include an analysis on provider productivity, throughput, duplicative testing and continuity of care.

Subtask 1.4 ***Deploy (via portal technology) a pilot demonstration of the electronic exchange of private sector ambulatory medical records with the DoD and other selected stakeholders using test data.***

Subtask 1.5 ***Perform a technical feasibility study to focus on repurposing the BHIE-AHLTA web services toward the existing NHIN Federal Adapter for the purpose of standards based exchange of Military Health System data domains with private sector partners.***

Subtask 1.6 ***Begin development on a private sector version of the Federal Gateway/Adapter (work to be based on the code that is anticipated to be available from ONC) using interoperable HITSP standards to progress the goals of this national effort.***

Subtask 1.7 Perform an assessment of the volume of cases that Conemaugh physicians have with SSA regarding veteran/military disability claims and assess provider satisfaction with existing SSA process for information gathering and submission.

Arm 2. The Impact of Consumer Informatics in the Chronic Care Model: Metabolic Syndrome in a Rural Setting

Subtask 2.1 Deploy HIE tools for patient and community outreach in varied rural environments.

Subtask 2.2 Research and evaluate the impact of a personal health record (PHR) on provider(s) and consumer(s) with particular focus on chronic disease prevention.

Subtask 2.3 Research and evaluate the impact of web-based secure messaging, online consultations, prescription renewals, and appointment scheduling on consumer awareness and their ability to effectively self manage their health compared to those consumers not using a PHR.

Completed – bold underline
In Progress – plain font

Administrative and logistical matters

June – August:

1. Cooperative agreement for MIDHT FY 08 was awarded on 2 June 2009.
2. John Hargreaves, Project Manager, attended the NHIN Connect seminar in Washington DC on 29-30 June 2009.
3. "Authorization to Proceed" was executed with subcontractor Northrop Grumman on 10 June 2009.
4. Complete "Technical Services Agreement" with Northrop Grumman was executed on 24 July 2009 after SOW review by LCDR Steve Steffensen. TATRC provided copy via email. POP expires on 31 January 2010.
5. Proposed PHR vendor for Arm 2 study, Medem iHealth, was acquired by MedFusion[1] on 21 July 2009 resulting in a new vendor direction and protocol development delay.
6. CVMH worked with Mariann Yeager from ONC to execute a test NHIN DURSA in order to exchange data with the Department of Defense.
7. Northrop Grumman personnel traveled to Washington, DC on 27 August 2009 to attend the NHIN Connect Code-a-Thon.

September – November:

1. CVMH presented entire MIDHT project at a TATRC-sponsored workshop at St. Francis University on 3 September 2009.
2. Members of the MIDHT team viewed the CONNECT 2.2 webinar on 6 October 2009.
3. CVMH and Northrop Grumman executed SOW Mod. #1 on 8 October 2009 to add valuable technical and documentation assistance with the DoD-managed VLER[2] Phase 1a project (Deliverable 16).
4. CVMH submitted contract modification request to Ms. Juanita Bourne on 20 October 2009. No response or approval has been received to date. LCDR Steffensen has pledged full support of the proposed revisions.
5. Conemaugh team members participated in Relay Health online training on 13 October 2009. Account setup, testing and additional training has occurred since with physicians, office managers and research team.
6. PHR protocol (09-32) received Conemaugh scientific approval on 6 October 2009 and IRB approval on 12 October 2009. Subsequently, Dr. Jeffrey Stephenson (TATRC) submitted protocol to Mr. Brian Garland (USAMRMC) on 21 October 2009. Reviewer was assigned and requested minor revisions to consent form and patient recruitment letter. Conemaugh submitted revised protocol to Ms. Andrea Hochheiser on 10 November 2009. Final USAMRMC approval is pending.

December – February:

1. PHR protocol (09-32) received USAMRMC IRB approval on 24 December 2009. Subsequently, the protocol was forwarded for final sign-off by Dr. David Carlson (Chief Medical Officer). His approval was delayed until the contract with Relay Health was fully executed, which occurred on 25 January 2010.
2. EHR protocol (10-00) received Conemaugh administrative panel approval on 13 January 2010. Scientific approval was received on 5 February 2010 and IRB approval on 11 February 2010. Subsequently, the protocol was sent to Dr. Stephenson (TATRC) for a pre-review on 16 February 2010. USAMRMC IRB received the protocol on 19 February 2010 from TATRC, approval is pending.
3. Northrop Grumman IS (subcontractor) worked in conjunction with numerous federal agencies to provide technical and documentation support for the Virtual Lifetime Electronic Record (VLER) 1a project. A related press release has been drafted, approval is pending.
4. Contract modifications were approved via emails from Juanita Bourne on 23-24 February 2010, which included a revised subcontractor budget, Statement of Work and purchase of a Tanita scale.
5. Conemaugh and Northrop Grumman extended their Technical Services Agreement (TSA) multiple times, with the most recent end date of 2 April 2010.
6. Members of the MIDHT team will present the Health Information Exchange (HIE) work between Conemaugh and DoD at the HIMSS conference in Atlanta, GA. Significant progress was made during this quarter in order to demonstrate a live exchange using NHIN CONNECT[3-4] v 2.1.5 and specific adapter components.
7. Conemaugh will submit a formal request in the next quarter to extend the prime contract period of performance.

March – May:

1. Project representatives successfully demonstrated a bi-directional health information exchange (HIE) between DoD and Conemaugh at the HIMSS conference in Atlanta, GA (1-3 March 2010)[5]
2. Northrop Grumman delivered all VLER 1a source code to a DHIMS representative on 12 March and 17 March.
3. John Hargreaves and Charlie Shaw presented the MIDHT project at the TATRC Product Line Review in Frederick, MD on 23 March. Panel comments were received on 28 April.
4. MIDHT open-source dynamic document assembler contribution (in partnership with TATRC) noted in national release of CONNECT v2.4 during 25 March webinar.[6]
5. All "Conemaugh adapter" code and related documentation (five cd copies) delivered to TATRC headquarters on 7 April and is being considered for release to FHA.
6. Conemaugh representatives held an introductory phone call on 13 April with the Veterans Affairs[7] (Tim Cromwell) to discuss the possibility of a production exchange in SW Pennsylvania.
7. Allen Barger (Northrop Grumman) attended the CONNECT Code-A-Thon in Miami, FL on 28-29 April and had multiple discussions with TATRC developers.

8. Conemaugh's subcontract with Northrop Grumman (NG) has terminated as of 30 April 2010. All NG deliverables have been completed and approved by Conemaugh and/or TATRC.
9. Period of performance for prime contract has been extended twelve months at no-cost, contract modification executed 3 May.
10. Project representatives will demonstrate the MIDHT HIE at two public events in June (Showcase for Commerce/Capital Hill HIT Showcase). TATRC officials have been notified in advance.
11. Conemaugh is finalizing its review/completion of the *NHIN Application for New Participants* (including DURSA). Point of contact is Adrian Anderson (NHIN team) and official submission will occur in the near future. Conemaugh is aware of the NHIN On-boarding process and required conformance testing.

Arm 1: Longitudinal Study for Use of Interoperable Accessible Health Information Exchange Services and Technologies in Rural Communities

Health Information Exchange/Virtual Lifetime Electronic Record (VLER) 1a summary

The second phase of MIDHT will further refine the CHS Portal capabilities created during Phase One to better align with the Military Health System (MHS) strategic goals and the Nationwide Health Information Network (NHIN). The MIDHT will continue to identify lessons learned/best practices that benefit the MHS environment, stakeholders in Southwestern PA and private sector hospitals/health systems nationwide.

- Project representatives attended the NHIN CONNECT conference on 29-30 June 2009 and held a meeting with TATRC leadership
- Project representatives viewed the NHIN CONNECT Release 2.1 webinar on 28 July 2009. The webinar reviewed changes made to CONNECT code in v2.1, as well as reviewing the CONNECT architecture
- Covisint, as initially planned, was not utilized to provide HIE services
- Northrop Grumman team members initiated meetings with the TATRC Advanced Concepts Team (ACT) and ONC leadership to discuss VLER – San Diego development work in August 2009 and the feasibility of the Patient Ancillary Web Services (PAWS)
- Northrop Grumman representatives, Steven Clark and Allen Barger, attended the CONNECT "Code-A-Thon" event on 27 August 2009. The event, which was attended by various corporations and federal organizations, presented interested HIT professionals with an opportunity to collaborate with

the CONNECT development team. While at the event, NG representatives participated in:

- Downloading, installing, and compiling the CONNECT source code
- Discussions around the SoapUI web service testing software and participation in demonstrations on how to write tests, create messages, and perform specific actions in both the free and professional versions of the product
- Discussions around the need to have a test NHIN platform and the benefits that would be realized by having such a platform to test CONNECT configurations against
- Discussions around "best practices" for CONNECT development.

- Conemaugh MIS team grew frustrated with Allscripts re: procurement of webservices for query-based response of a Continuity of Care Document as initially planned. An XML-based CCD was currently available only as a manual "push." After consultation with Northrop Grumman, team decided to utilize the CONNECT "Document Assembler" approach utilizing HL7 messaging to build a CCD from individual data domains (patient demographics, allergies, medications and problems)

- Northrop Grumman configured development and test environments in Johnstown, Salt Lake City and Chantilly, including standing up a DoD and CHS gateway with CONNECT v. 2.1.5 code (open-source)

- Northrop Grumman designed VLER spreadsheet for mappings of data types

- NG constructed mappings of the PAWS Connector for each of the 4 data types:
  - Allergies: PAWS to CAL, CAL to C83
  - Problems: PAWS to CAL, CAL to C83
  - Pt Info: PAWS to CAL, CAL to C83
  - Medications: PAWS to CAL, CAL to C83

- On 16 November 2009, Northrop Grumman delivered a fully functional code drop to the FHA team, thus meeting SOW Deliverable 16. This drop was made via *Dropbox*, a repository used by the TATRC/Northrop Grumman/FHA developers.

- In addition to delivery of binary code, Northrop Grumman also provided Phase 1a source code to the FHA, with the intent of the FHA team folding it into the CONNECT v2.1.5 baseline for release with CONNECT v2.3.

- NG provided a "Software Design Document" and "System Installation Guide" to DHIMS and FHA representatives, among other documents

- Conemaugh Health System implemented a partial Common Access Layer Service Interface to return to a remote partner HL7 v3 CDA documents from an underlying clinical information system. The Common Access Layer Service Interface web service was developed in Microsoft.NET.
    - AllScripts TouchWorks was the underlying clinical information system from which data was provided. No application programming interface existed within the clinical information system via which to return information. Therefore, a web service was implemented to retrieve data directly from the clinical system's backend database via a mix of pre-existent stored procedures and custom database queries. Data domains included active patient demographics, problems, allergies and medications.
    - Additionally, 13 Conemaugh test patients were created to match the selected TATRC CDR patients. Data was entered into the Allscripts EHR for testing purposes. TATRC arranged AHLTA VM (test) access for our HIMSS demo with FHA for displaying of Conemaugh data.

- Ability to connect to the CHS Initiate and Allscripts servers (within Conemaugh's data center) was verified by Northrop Grumman

- Continued to integrate and deliver urgent fixes for any bugs found during the FHA install and testing process for VLER 1a

- Created Initiate Adapter: Mapped Initiate output → V3 HL7

- Northrop Grumman adapted their clinical viewer for MIDHT use and integrated application with the Universal Inbox for correct displaying of C32's

- Created Allscripts Adapter
    - NG development team worked in conjunction with CHS personnel to stand-up CHS Allscripts Adapter
    - NG development team provided CHS personnel with appropriate WSDL's
    - NG development team created connection to existing CHS Allscripts Adapter
    - Achieved a successful return of care records from the CHS Allscripts System

- John Hargreaves, Thomas Simunich and Allen Barger represented MIDHT at the HIMSS conference and exhibition during the first week of March in Atlanta, GA. This provided a good opportunity for collaboration with military and government representatives. Our successful demonstration showed a bi-directional health information exchange of test C32 documents (refer to Appendix A for sample

screenshots) between Conemaugh and DoD utilizing the NHIN CONNECT v2.1.5 architecture.

- Conemaugh project members reviewed and added specific Allscripts (version 11.1.7.283) documentation to the "CHS Adapter Installation and Configuration Guide" created by Northrop Grumman. In addition, all related source/binary code was compiled and burned onto cd's for distribution to TATRC on 7 April 2010 (in addition to NG code).

- Fields to display prefix, suffix, middle initial and gender were added to the Clinical Viewer GUI

    - Development to enable pulling this information back from the adapter was completed

- Development was completed to allow Universal Inbox to accept an encrypted patient ID

- Work was completed that allowed Universal Inbox to be "publicly" viewed (outside of the internal NG 10-net)

- Work was completed to remove any PHI from displaying within the Clinical Viewer URL

- Northrop Grumman delivered all VLER 1a source code to a DHIMS representative on 12 March and 17 March

- Response time to return documents exceeds an acceptable level, further investigation and collaboration is needed

- Allen Barger attended the CONNECT Code-a-Thon conference in Miami, FL from 27 – 29 April 2010, where he:

    - Worked with the TATRC Advanced Concepts Team (ACT) on a fix for the document return latency issue

    - Spoke to participants about the private sector implementation of the document assembler at a class taught by members of the TATRC ACT team

- Installed CONNECT v2.4.1 on local Johnstown development environment and local environment in Salt Lake City, Utah

    - Overlaid document assembler components on this version, with compatibility evaluation on-going

Picture Archive and Communications System (PACs) Implementation within Conemaugh Health System

Extending the McKesson PACs, Radiology Information System (RIS) and Dolbey Digital Dictation system used at Memorial Medical Center to Miners and Meyersdale Medical Centers will allow us to achieve consistency across the health system when it comes to radiology imaging, report management, and access. This will be of great value to the physicians and patients of the health system, reduce redundancy of diagnostic testing, and ultimately provide better care to our patients.

Memorial Medical Center's MIS Department worked closely with resources from McKesson's MRM and HMI divisions. Relevant system design and table builds were identified. Workflow processes among the three entities were reviewed and altered to accommodate the new integrated process.

Summary of Activities:

- Workflow and policies for establishing Miners and Meyersdale on the Memorial PACS system designed
- Set up of off-hour image transmission
- Radiologists reading stations installed at both facilities
- Radiologist and technologist workstations purchased, configured and installed at both facilities
- Vidar film digitizers installed at both facilities
- Computerized Radiology (CR) devices installed at both facilities
- Document scanners installed at both facilities
- Dolbey dictation equipment and software license obtained and installed for both facilities
- Purchase of McKesson PACs software licenses for MyMC and MiMC facilities
- Staff from Miners and Meyersdale trained by Memorial Radiology and Management Information Systems Departments on use of PACS
- Workgroups built in PACS to accommodate workflow for Miners and Meyersdale

- Networking group provided needed cabling and networking services to provide workstation and modality network connectivity and access from both Miners and Meyersdale

- **July 1, 2009: PACS live at Miners and Meyersdale for image transfer only**

- Training of Miners and Meyersdale Radiology staff on RIS functionality

- Identified tables to be scripted for test environment

- Cross-reference exam master, charge master added to spread sheet to be used for scripting in large tables

- McKesson upgraded test server - retested application

- Tested MiMC and MyMC added reports – footer was incorrect

- Application testing/HRM HIM integration testing

- Status changes from HMI to HRM did not work (Corrected)

- Built the following HRM tables in Live:

  o Facilities, Locations, Modalities, Work list, Film Libraries, Film jacket types and locations and Pt Class

- Edited the following tables in Live to be Enterprise wide:

  o Admin Route, Pt Condition and Normals

- EMPI/ADT/Integration testing

- **Productive use via McKesson Care Portal implemented January 19, 2010**

- Post-live support provided to MiMC and MyMC

- Weekly calls continued between MMC, MiMC, and MyMC to identify post-live Issues

- McKesson assisting with vendor identified issues

- Continued weekly calls to validate process and resolve issues

- McKesson continued to be engaged to assist with patient merge issue

Electronic Health Record Research Study A-15835.2

Respective protocol received Conemaugh administrative, scientific and IRB approvals during the third project quarter. Andrea Hochheiser (USAMRMC Human Subjects Protection Scientist) reviewed the protocol and requested revisions from Conemaugh on 26 March 2010. Draft revisions were shared/discussed during the month of April and a new version (5.10.10) was approved by Conemaugh's IRB on 13 May 2010. USAMRMC IRB approval was granted on 18 May 2010, allowing Conemaugh to begin study implementation. Distribution of EHR surveys to staff/physicians and comprehensive workflow shadowing of staff/physicians at both locations will begin in June as the EHR stabilization period has ended. Distribution of Social Security Administration Assessment surveys to office managers is underway.

Study objectives include:

- Workflow analysis post-EHR implementation using a Time & Motion tool (19 providers – 2 offices)
- Productivity analysis per physician post-EHR implementation (billing charges, RVU's, # of hours worked, avg. encounters)
- EHR Implementation Survey – Staff at Portage Health Center and NORCAM
- SSA Assessment Survey – CHS office managers

PACS Research Study

Development of the final research protocol (retrospective) for this contract has been completed. Submission materials needed to begin official research review at Conemaugh ORA are almost complete. Project team expects to receive all Conemaugh approvals during the next quarter and subsequently submit to USAMRMC IRB for review/approval. A copy of the protocol is available upon request.

Study objectives include:

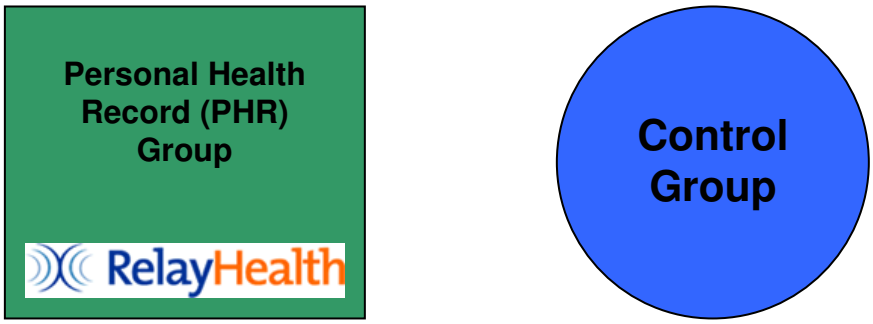
- Quantitative analysis of duplicate testing (chest x-ray, CT scan head) pre and post PACS deployment for shared patients (between central site and rural sites)
- PACS opinion survey for qualitative analysis – MMC medical staff
- PACS usage reports, proportionate sample – MMC medical staff

Arm 2: The Impact of Consumer Informatics in the Chronic Care Model: Metabolic Syndrome in a Rural Setting.

Personal Health Record (PHR) Research Study A-15835.1

This protocol represents an expansion for Arm 2 of MIDHT, which continues to focus on consumer informatics and community outreach in rural settings. The intent is to extend the boundaries of the hospital "brick and mortar" structure to community members and patients in rural SW PA by exploring health information technology solutions and services that maximize patient and provider interactions, ultimately affecting health outcomes and lowering health care costs. Enrolled research subjects, meeting metabolic syndrome criteria, will have the opportunity to use an electronic personal health record (PHR) and therefore the ability to store health information and communicate with healthcare providers using a secure, HIPAA compliant website.

Due to the Medem corporate transaction and resulting uncertainties, Conemaugh selected Relay Health as our PHR vendor. This study will be a longitudinal prospective pilot study. The study duration relative to each active subject will be six months. Comparisons via qualitative and quantitative methods will be used to investigate the research questions. Data collection for the outcome measures will be collected at three points in time – baseline, 3 months, and 6 months. Enrolled subjects meeting the inclusion criteria will be randomized into two groups as shown below. All enrolled subjects will be established patients of CPG physicians at Portage Health Center or CPG Berkley Hills.



The PHR protocol (09-32) received Conemaugh scientific approval on 6 October 2009 and IRB approval on 12 October 2009. Subsequently, Dr. Jeffrey Stephenson (TATRC) submitted the protocol to Mr. Brian Garland (USAMRMC) on 21 October 2009. Reviewer was assigned and requested minor revisions to consent form and patient recruitment letter. Conemaugh submitted revised protocol to Ms. Hochheiser on 10 November 2009. Final USAMRMC IRB approval was issued on 24 December 2009.

Conemaugh team members participated in Relay Health online training on 13 October 2009. Account setup, testing and additional training has occurred with physicians, office managers and research team. Conemaugh executed an additional contract with Relay Health for a 15-month term and seven physician licenses.

Subject recruitment for the respective PHR study has been challenging. Interest has been greatest from patients deriving from the suburban physician office whereas anecdotal concerns persist regarding Internet access and an elderly population in the rural community of Portage. New recruitment ideas are being discussed and implemented. Below is a summary recruitment table to date. Subject recruitment efforts and screenings for the respective study will continue in June. The first wave of active PHR subjects is expected to begin use of application next quarter. The study team will inform subjects in that group how to setup and utilize the online application.

MIDHT PHR	
Inquiries	**33**
Screenings	**20**
Enrolled (Control & PHR)	**18**
Screen Failure	**2**
As of 31 May 2010	

Table 1. Recruitment Status

Key Research and Development Accomplishments

- Northrop Grumman support of White House mandated Virtual Lifetime Electronic Record (VLER) 1a project in San Diego, CA
- Northrop Grumman contribution of document assembler code to national FHA CONNECT release 2.4 (in partnership with TATRC/FHA)
- Successful bi-directional health information exchange between Department of Defense and Conemaugh (test data) utilizing NHIN model
- Full disclosure and submission of technical documentation and code (source/binary) to TATRC headquarters
- Two (2) active Conemaugh research protocols, third (final) protocol in progress
- The following table summaries Northrop Grumman deliverables that have been completed and approved by Conemaugh/TATRC.

No.	Title	Due Date
4	Demonstration of Electronic Exchange of Test Allscripts CCD via CHS Portal	Completed 4/1/2010
5	Technical and Functional Requirements – Phase II	Completed 2/23/2010
6	Technical Feasibility Study – Migrating AHLTA/BHIE Web Services Towards NHIN	Completed 9/30/2009
7	NHIN Background/Gap Analysis	Completed 2/22/2010
8	Migration Plan for Movement from Viewable (Textual) Data to Computable Data	Completed 1/15/2010
9	Electronic Patient Consent Assessment Report	Completed 9/30/2009
10	Demonstration of the NHIN Adaptor With One Site	Completed 4/1/2010
11	Assist with DURSA Submission	Completed 1/21/2010
12	Disclosure of Technical Specifications	Completed 4/3/2010
13	Checklist of Criteria Met/Unmet Necessary to Meeting HIE Accreditations and Certifications	Completed 3/12/2010
14	MIDHT Portal Test Plan	Completed 3/19/2010
15	Inventory List	Completed 1/25/2010
16	VLER Code Drop to FHA	Completed 1/18/2010

Table 2. Northrop Grumman Deliverables

Reportable Outcomes

- Conemaugh Research Poster Symposium – Johnstown, PA
- John Hargreaves presentation (PHR) at Cambria-Somerset Council Conference at the Slopes – Champion, PA
- John Hargreaves presentation (PHR) at Cambria-Somerset Council Aging Conference – Champion, PA
- HIMSS Health Information Exchange Demonstration – Atlanta, GA
- Northrop Grumman contribution of "document assembler" code to nationally available FHA CONNECT release 2.4 (open-source)
- Virtual Lifetime Electronic Record 1a[8] project tasks completed by Northrop Grumman
- Allen Barger presentation at CONNECT Code-A-Thon – Miami, FL

	DoD Adapter	Conemaugh Adapter
Jar Files		
	AdapterDocumentAssemblyProxyEJB.jar	AdapterDocumentAssemblyProxyEJB.jar
	BOSServiceEndpointProviderEJB.jar	BOSServiceEndpointProviderEJB.jar
	AdapterCommonDataLayerEJB.jar	
	DocumentManagerEJB.jar	DocumentManagerEJB.jar
	DocumentRepositoryEJB.jar	DocumentRepositoryEJB.jar
	DoDConnector.jar	CHSConnector.jar
	MpiEJB.jar	MpiEJB.jar
	NHINAdapterServiceEJB.jar	NHINAdapterServiceEJB.jar
	NhincHL7JaxbLib.jar	NhincHL7JaxbLib.jar
Properties Files		
	Adapter_common_datalayer.properties	
	Adapter.properties	Adapter.properties
	DoD_connector.properties	CHS_connector.properties
	Repository.properties	Repository.properties

SQL Scripts		
	Docassembly_dll.sql	Docassembly_dll.sql
	Docrepository_dll.sql	Docrepository_dll.sql
	Templatedb_dll.sql	Templatedb_dll.sql
WSDL Files		
	BOSServiceEndpointProvider.wsdl	BOSServiceEndpointProvider.wsdl
	AdapterCommonDataLayer.wsdl	
	DocumentAssembly.wsdl	DocumentAssembly.wsdl
	DocumentManager.wsdl	DocumentManager.wsdl
	DocViewerRequestServicesService.wsdl	DocViewerRequestServicesService.wsdl
	DoDConnector.wsdl	CHSConnector.wsdl
WAR Files		
	UniversalClientGUI.war	UniversalClientGUI.war
	UniversalClientWS.war	UniversalClientWS.war
XML Files		
	adapterServicesMappings.xml	adapterServicesMappings.xml
XSL Files		
	CCD.xsl	CCD_CHS.xsl
Allscripts Folders		
		allscriptsdataset
		soapextender
		webservices

Table 3. MIDHT Technical Specifications Delivered to TATRC/DHIMS

Conclusion

The health information exchange developed under this contract is a crucial first step allowing electronic health records to be shared between the public and private sectors, allowing for better coordination of care, quality of care and improving safety for shared patients seen in varied locations. MIDHT has aligned with the Nationwide Health Information Network, a "set of standards, services and policies that enable secure health information exchange over the Internet. The NHIN will provide a foundation for the exchange of health IT across diverse entities, within communities and across the country, helping to achieve the goals of the HITECH Act."[9]

All source/binary code developed under this contract has been provided to the government for re-use and modification in a production environment. Furthermore, components of the "document assembler" are currently available in an open-source manner from the FHA CONNECT website (www.connectopensource.org), thus allowing hospitals and technology vendors nationwide to download this functionality. Future project work will add additional data domains to the exchange and take the required steps to move into a production environment in SW PA.

Results of the research studies (in progress) will provide insight regarding the adoption, satisfaction, and benefits of health information technologies within a rural healthcare system. Will providers become more efficient and productive using electronic health records? Does electronic access to images performed at another location reduce duplicate testing? Are consumers eager to adopt online tools to record their health information and contact their physician electronically regarding non-urgent issues? Both qualitative and quantitative instruments will be utilized to form sound conclusions.

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Appendices

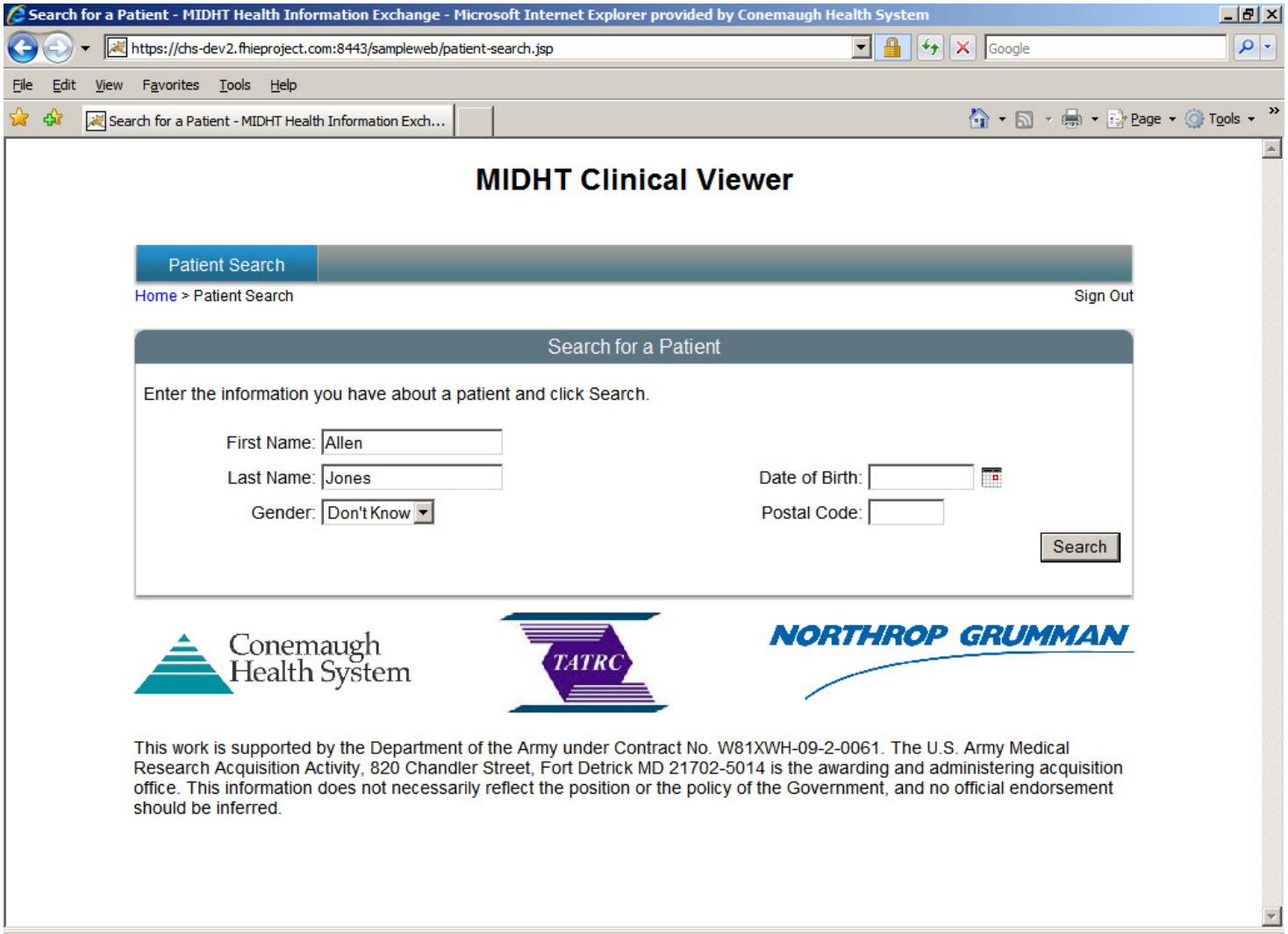


Fig. 1 - Conemaugh provider searching for patient – MIDHT Clinical Viewer (test)

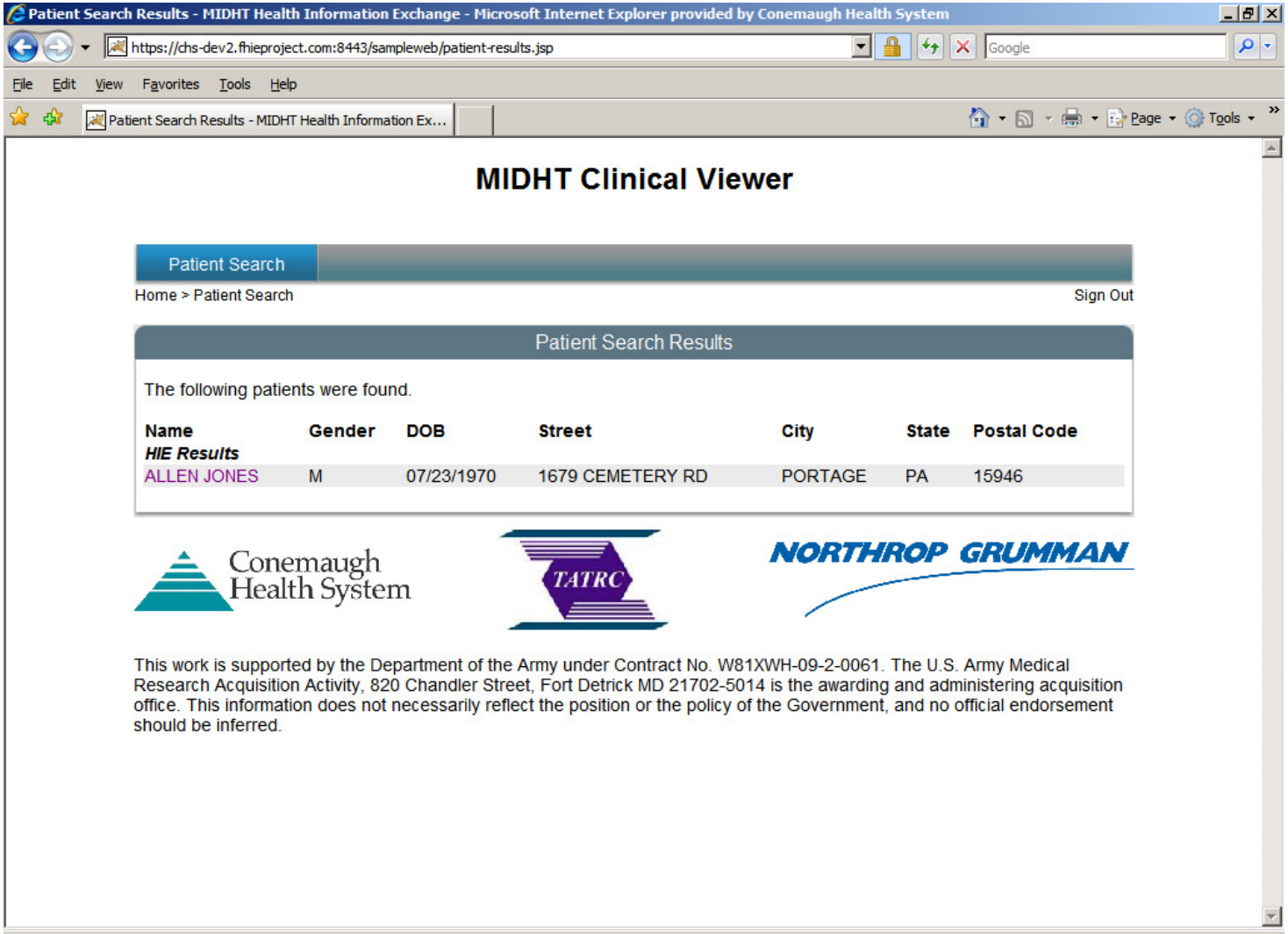


Fig. 2 - Patient found utilizing Initiate EMPI web service

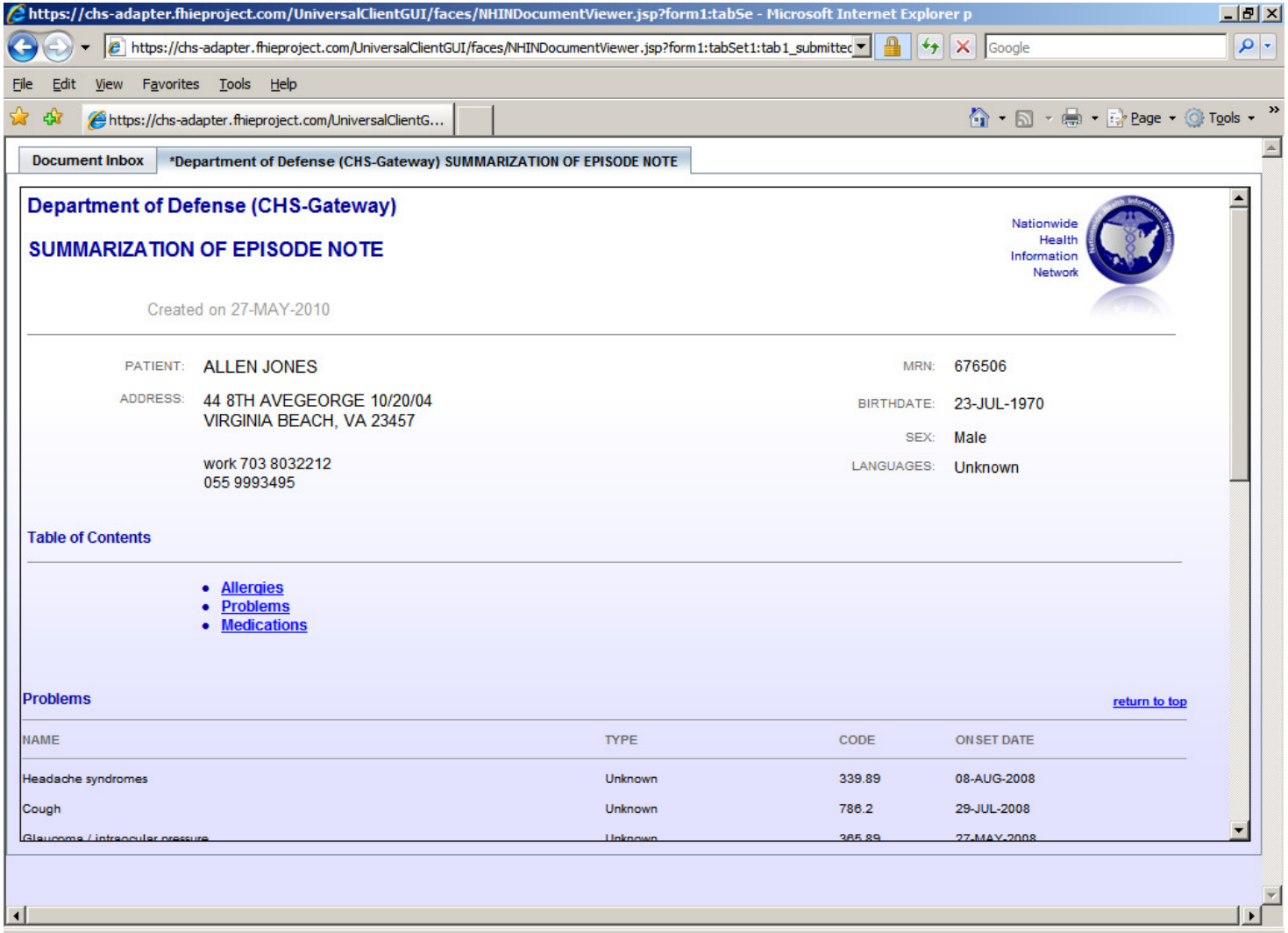


Fig. 3 - Conemaugh provider retrieving DoD (AHLTA) data from "Document Inbox"

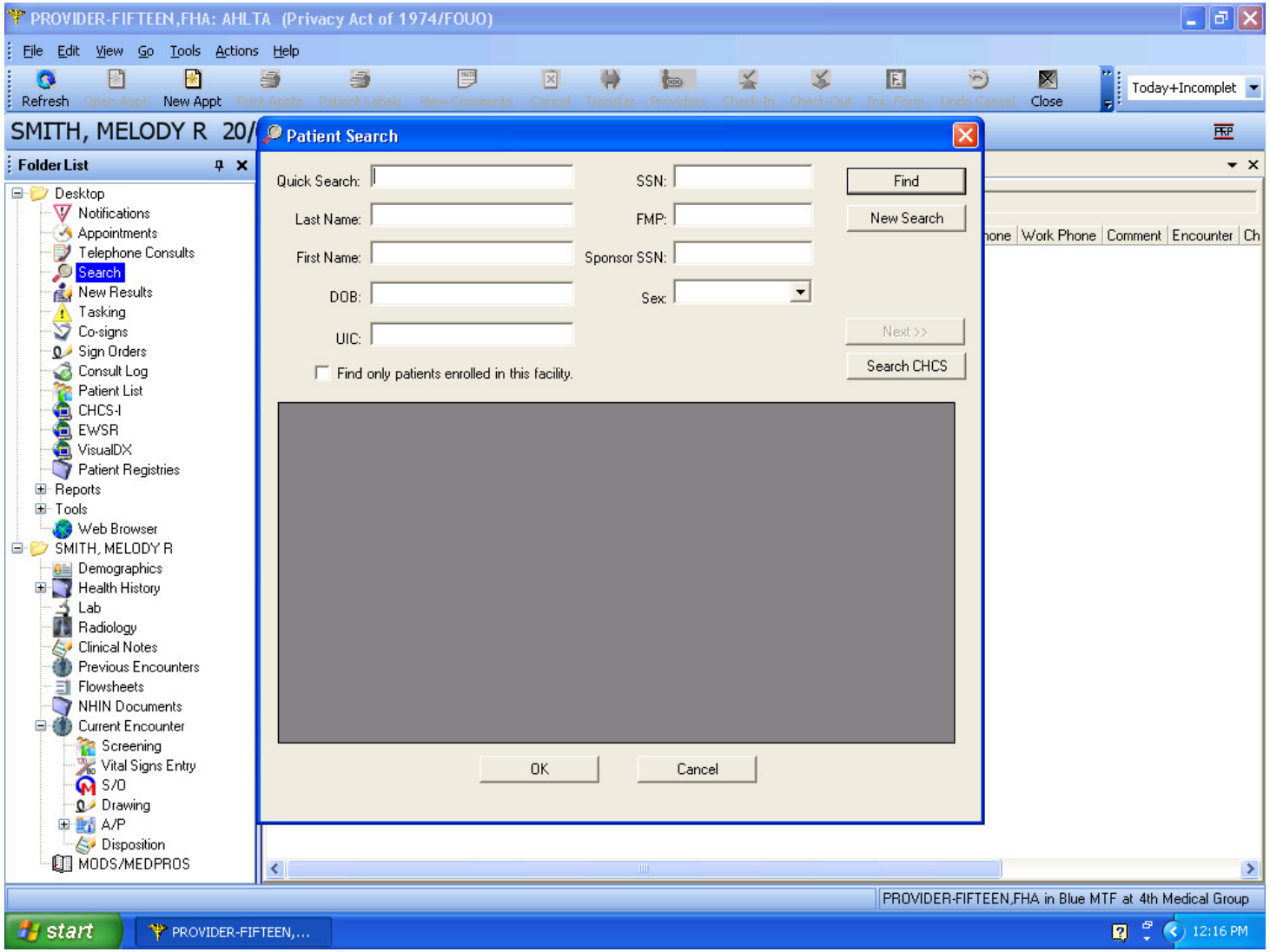


Fig. 4 - DoD provider searching for patient - AHLTA Client (test)

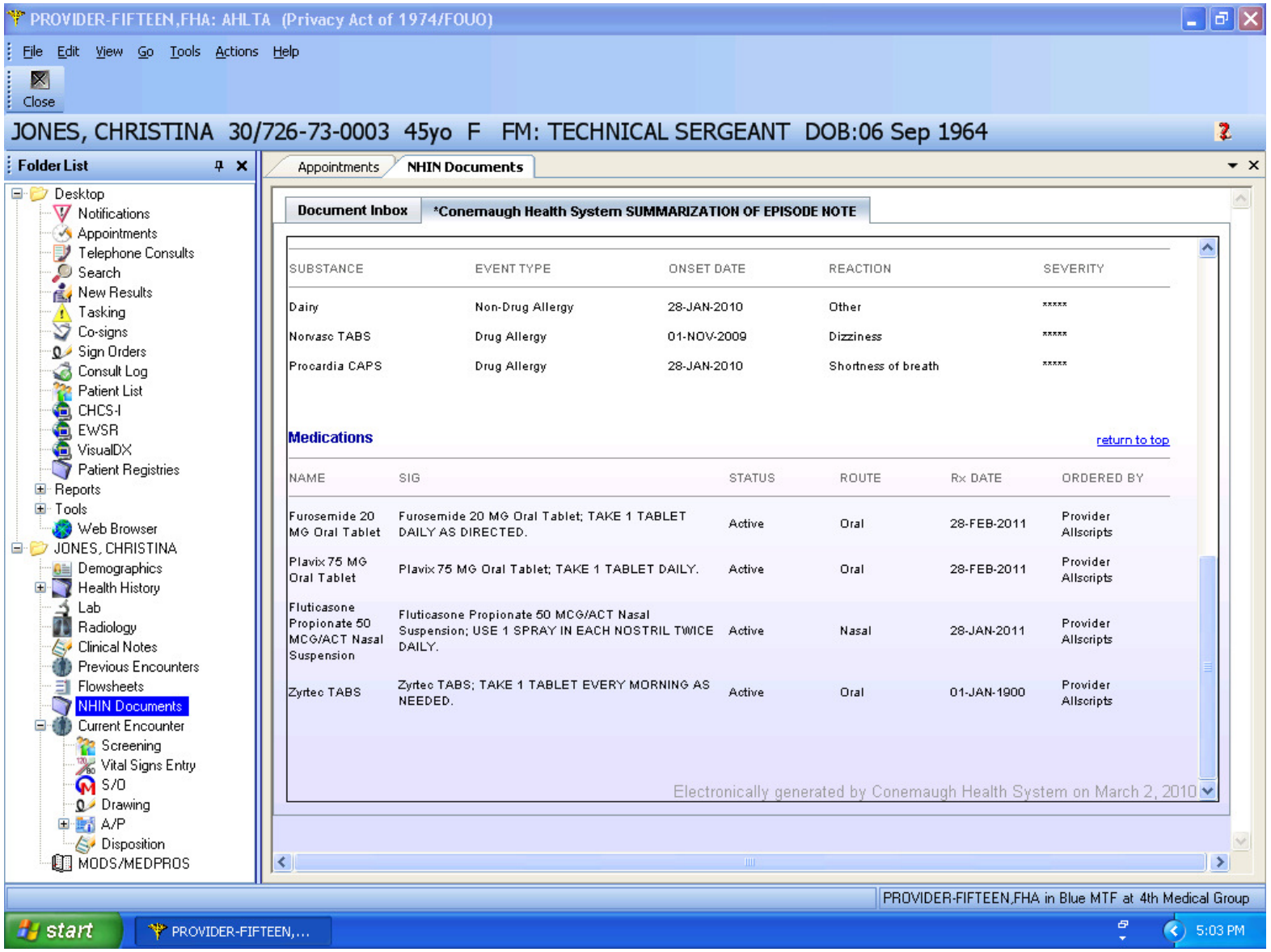
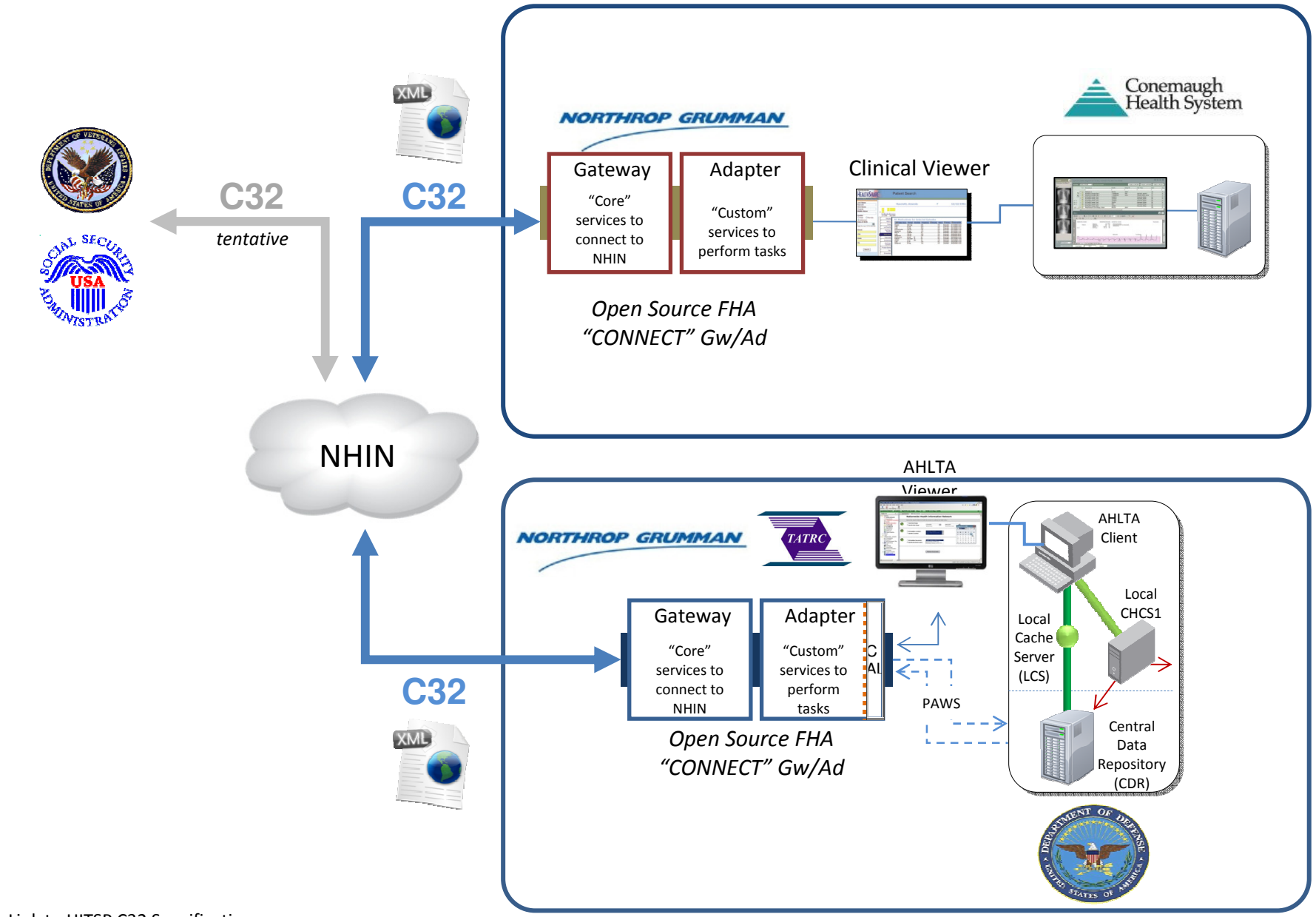


Fig. 5 - DoD provider retrieving Conemaugh (Allscripts) data from "NHIN Documents" folder



Link to HITSP C32 Specification:
http://www.hitsp.org/ConstructSet_Details.aspx?&PrefixAlpha=4&PrefixNumeric=32

Fig. 6 – Health Information Exchange Architecture

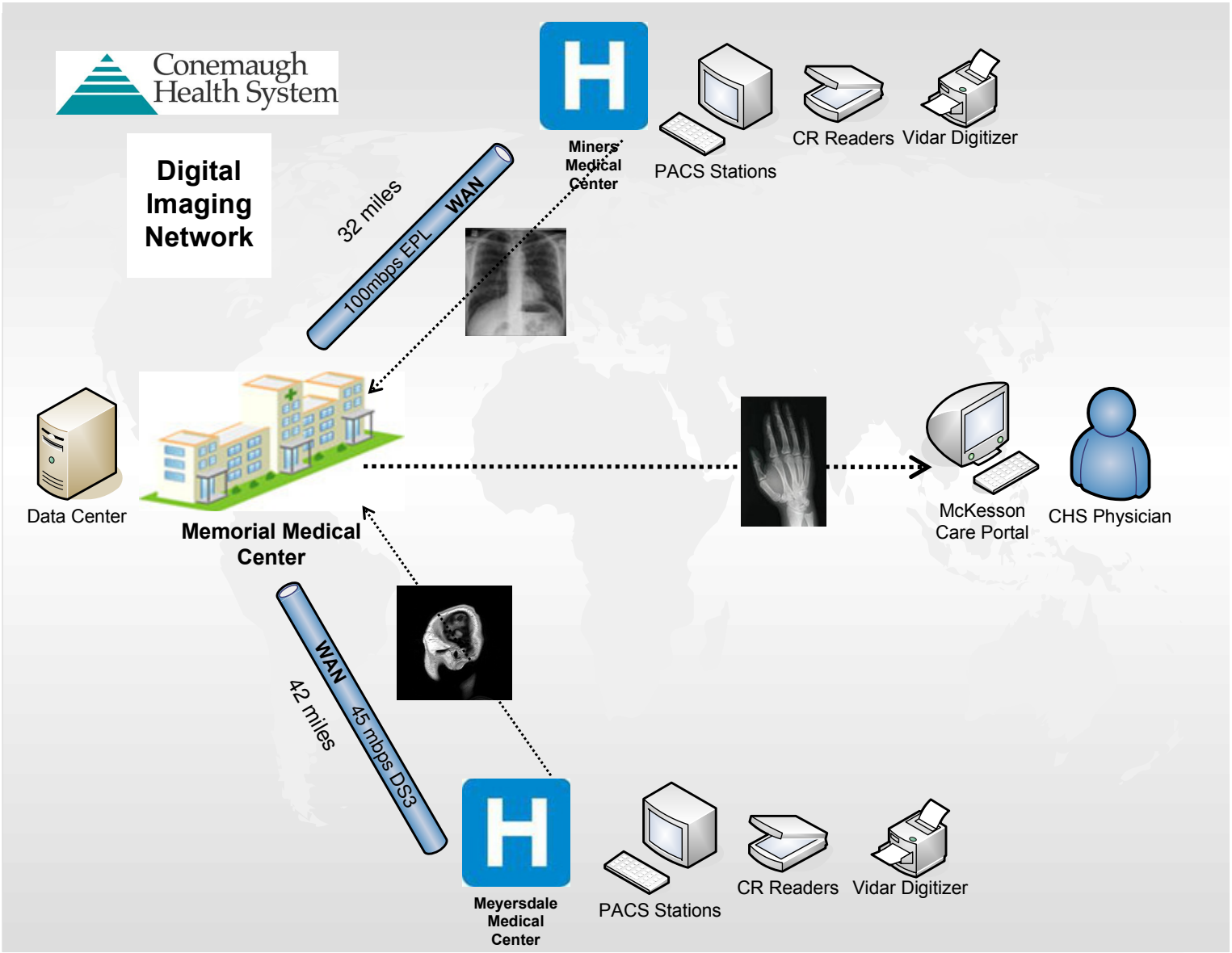


Fig. 7 – Digital Imaging Network

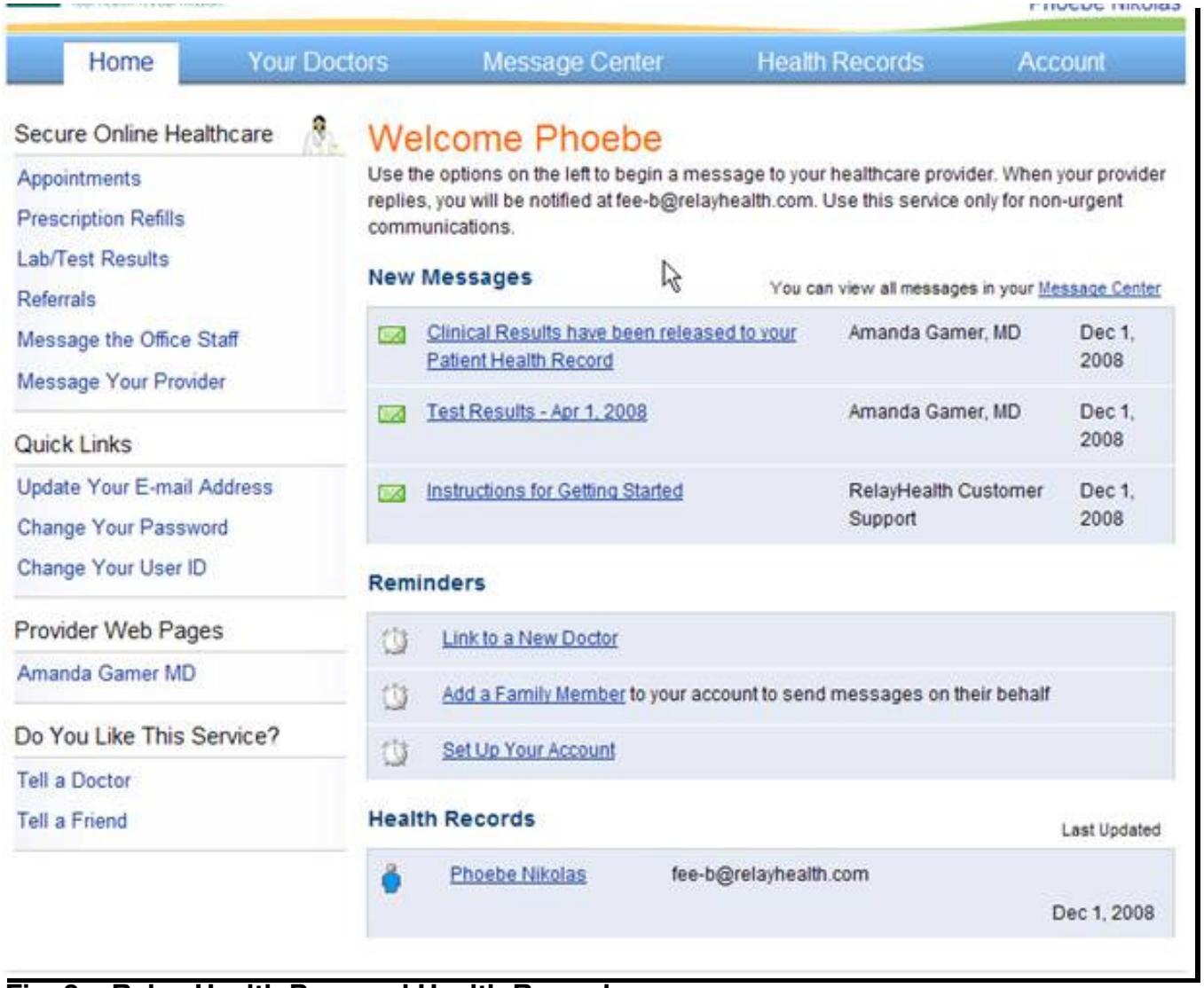


Fig. 8 – Relay Health Personal Health Record

Acronym	Description/Definition
ACT	Advanced Concepts Team
ADT	Admissions / Discharge / Transfer
AHLTA	Armed Forces Health Longitudinal Technology Application
AHRQ	Agency for Healthcare Research & Quality
BHIE	Bi-directional Health Information Exchange
CAL	Common Access Layer
CCD	Continuity of Care Document
CDA	Clinical Document Architecture
CDR	Clinical Data Repository
CHS	Conemaugh Health System
CPG	Conemaugh Physician Group
CM	Configuration Management
CR	Computerized Radiography
CT	Computed Tomography
CVMH	Conemaugh Valley Memorial Hospital (dba "MMC")
DHIMS	Defense Health Information Management System
DoD	Department of Defense
DURSA	Data Use and Reciprocal Support Agreement
EHR	Electronic Health Record
EMPI	Enterprise Master Patient Index
FHA	Federal Health Architecture
FY	Fiscal Year
GUI	Graphical User Interface
HIE	Health Information Exchange
HIMSS	Healthcare Information and Management Systems Society
HIN	Health Information Network
HIPAA	Health Insurance Portability and Accountability Act
HIT	Health Information Technology
HITSP	Health Information Technology Standards Panel
HL7	Health Level 7
HMI	McKesson Horizon Medical Imaging - PACs
IRB	Institutional Review Board
JAR	JAVA Archive
LCDR	Lieutenant Commander
MHS	Military Health System
MIDHT	Military Interoperable Digital Hospital Testbed
MiMC	Miners Medical Center
MIS	Management Information Systems
MMC	Memorial Medical Center
MRM	McKesson Radiology Manager – Radiology Information System
MyMC	Meyersdale Medical Center
NG	Northrop Grumman
NHIN	Nationwide Health Information Network
ONC	Office of National Coordinator for Health Information Technology
ORA	Office of Research Administration
PA	Pennsylvania
PACs	Picture Archiving and Communication System
PAWS	Patient Ancillary Web Services
PHI	Protected Health Information
PHR	Personal Health Record
POP	Period of Performance
PR	Purchase Requisition
PT	Patient

RIS	Radiology Information System
SDD	Software Design Document
SOAP	Simple Object Access Protocol
SOW	Statement of Work
SQL	Structured Query Language
SSA	Social Security Administration
SSL	Secure Sockets Layer
SW	Southwestern
TATRC	Telemedicine & Advanced Technology Research Center
TMA	TRICARE Management Activity
TSA	Technical Services Agreement
UAT	User Acceptance Testing
USAMRMC	United States Army Medical Research & Materiel Command
VLER	Virtual Lifetime Electronic Record
VM	Virtual Machine
WAN	Wide Area Network
WAR	Web Application Archive
WSDL	Web Service Description Language
XML	Extensible Markup Language
XSL	Extensible Stylesheet Language